R E P O R T R E S U M E S

ED 003 334 24

A METHOD OF STIMULATING ORIGINAL THINKING IN COLLEGE STUDENTS.

BY- ROBERTSON, MALCOLM H.
WESTERN MICHIGAN UNIV., KALAMAZOO

REPORT NUMBER CRP-2235 PUB DATE 64
EDRS PRICE MF-$0.09 HC-$1.20 30P.

DESCRIPTORS- *CREATIVE THINKING, *SENSORY EXPERIENCE, *ORIGINALITY, *COLLEGE STUDENTS, *TESTING, MALES, KALAMAZOO, MICHIGAN, KENT ROSANOFF WORD ASSOCIATION TEST, GUILFORD CREATIVE BATTERY

AN ATTEMPT WAS MADE TO SUBSTANTIATE THE HYPOTHESES THAT SUBJECTS RECEIVING SENSORY DEPRIVATION WOULD SHOW MORE IMPROVEMENT IN ORIGINALITY THAN THOSE EXPOSED TO A NORMAL SENSORY ENVIRONMENT, AND THOSE SUBJECTS RECEIVING 4 HOURS OF ISOLATION WOULD SHOW MORE IMPROVEMENT IN ORIGINALITY THAN THOSE RECEIVING 2 HOURS OF ISOLATION. ABOUT 60 VOLUNTEER, MALE COLLEGE STUDENTS, RANDOMLY DIVIDED INTO 4 EQUAL GROUPS, WERE GIVEN THE KENT-ROSANOFF WORD ASSOCIATION TEST AND 3 TESTS FROM THE GUILFORD CREATIVE BATTERY. TWO GROUPS WERE EXPOSED TO SENSORY DEPRIVATION FOR 4 HOURS AND FOR 2 HOURS, RESPECTIVELY. THE REMAINING TWO GROUPS WERE EXPOSED TO A NORMAL SENSORY ENVIRONMENT FOR 4 HOURS AND FOR 2 HOURS, RESPECTIVELY. THE SAME TESTS WERE ADMINISTERED AGAIN. THE HYPOTHESES WERE NOT CONFIRMED. THE RESULTS WERE DISCUSSED IN TERMS OF INSTRUCTIONAL SET, TYPE OF TEST ADMINISTRATION, AND THE EFFECT OF PERCEPTUAL ISOLATION ON COGNITIVE EFFICIENCY. (JM)

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Office of Education
This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated do not necessarily represent official Office of Education position or policy.

Approved
Dec. 8, 1964

A METHOD OF STIMULATING ORIGINAL THINKING IN COLLEGE STUDENTS

Cooperative Research Project No. 2235

Malcolm H. Robertson

Western Michigan University
Kalamazoo, Michigan
1964

The research reported herein was supported by the Cooperative Research Program of the Office of Education, U. S. Department of Health, Education and Welfare.

ED 003334

TABLE OF CONTENTS

	Page
INTRODUCTION	1
METHOD	7
RESULTS	12
DISCUSSION	16
SUMMARY	18
REFERENCES	19
APPENDICES	20

LIST OF TABLES

Table | Page

1. The "t" values for within group comparisons on pre and post scores for each originality measure 14

2. The "t" values for between group comparisons on amount of change for each originality measure 14

INTRODUCTION

The bulk of research on sensory deprivation concerns the impairment of behavior that results from perceptual isolation. Only a few investigators have considered the alternate possibility, that exposure to sensory deprivation may have a positive beneficial effect on an individual's behavior. The purpose of this research was to determine the extent to which original thinking can be enhanced or improved by sensory deprivation. Specifically, the study was designed to examine the following hypotheses:

1. Subjects experiencing sensory deprivation show significantly greater original thinking, as measured by the Guilford Creative Battery and the Kent-Rosanoff Word Association Test, than subjects not experiencing sensory deprivation.

2. Subjects experiencing a four hour period of deprivation show significantly greater originality than subjects experiencing a two hour period of deprivation.

In a summary of studies on the training of originality, Maltzman (1960) makes a useful distinction between originality and creativity. He states that the former refers to behavior which is uncommon under given conditions, is relevant to those conditions, and can be studied in a systematic manner under experimentally controlled conditions. On the other hand, creativity is referred to as the products of original behavior and the reactions of other members of society to such products (see also Stein, 1953). Creativity involves more than originality, and consequently it is more difficult to study in a laboratory-type situation. Similarly, MacKinnon (1962) states that creativity fulfills at least three conditions:

1. A response or idea that is novel or at least statistically infrequent.

2. The response or idea must solve a problem or accomplish some defined goal.

3. The response or idea must be fully developed.

The last condition is understandably difficult to test adequately in the laboratory. Also, Maltzman (1960), Guilford (1952), and Meddow and Parnes (1959), support the proposition that originality can be systematically improved as well as measured. Thus, originality can be described as uncommon but adaptable; can be studied and improved in a scientific manner; and qualifies as creative thinking when its impact can be shown to extend beyond the specific laboratory situation. In view of these considerations, this research project was limited to the study and improvement of original thinking.

In discussing the distinction between intelligent thinking and original thinking, several investigators have indicated that the verbal comprehension component of general intelligence determines some of the variance among scores on tests of originality. This point is not to be construed as a criticism of the research. To study original thinking by employing verbal stimuli of some degree of structure is a defensible procedure. The distinction between intelligence and originality can still be maintained. For example, as Guilford (1950) has pointed out, the content of intelligence tests reveals little that is obviously of a creative nature. In fact, as Guilford points out, a major limitation in the use of conventional intelligence tests for measuring originality is that the principles for solving the problems are found in the instructions or through practice questions. All the data needed to solve the problems are perceptually present, and as a result the discovery of such data may be said to be imposed on the subject (Springbett, Dark, and Clake, 1957).

While the tests used in this research employ verbal stimuli, they were constructed for the specific purpose of measuring original thinking. As McKinnon (1962) points out, if a person has the minimum intelligence for competence in a field, "whether he performs creatively or banally will be determined by non-intellective factors". In this connection, a dedicated attitude, cognitive flexibility, and receptivity to experience, as well as a concern for the larger meaning of experience, will likely be among the critical non-intellective factors.

One limitation in much of the research in this field has to do with the reliability of the measures of original or creative behavior. The reliabilities of many of the tests are consistently low. On consideration is that the lack of reliability may reflect the high degree of variability of original behavior. Another more obvious consideration concerns the typical errors of measurement found in psychological tests. The reliability of such measures might be improved by providing the subject with alternative answers or finished products from which to choose, as in the traditional multiple-choice item. However, as Guilford (1953) has pointed out, there is the risk of preventing the subject from demonstrating the characteristic most desired, namely, his creativity. In this project a control group was used to determine the importance of the reliability factor.

Another consideration in experiments designed to measure originality is the importance of instructions to the subject. Different instructions concerning the response have different effects on the end product. For example, Christensen, Guilford, and Wilson (1957) state that with instruc-

tions emphasizing inventiveness rather than simple recall, response productivity will remain constant. Also, instructions designed to evoke cleverness will reduce the total number of responses, probably as a result of a self-imposed consorship, but increase the number of clever responses as well as the average degree of cleverness. In this study, test instructions to the subject suggested a quantitative criterion, although the scoring was based on a qualitative as well as quantitative criterion.

One final point concerns the distribution of originality in the population. Maltzman (1960) believes that original behavior is related to the individual's part behavior and to the norms of a population of which he is a member (see also Stein, 1953). In short, original behavior, although found in all but a very small percentage of the general population, must always be studied within the context of some group norm. In the research to be reported, the specific norm was that of a college population.

The decision to use sensory deprivation as a means of increasing or enhancing originality is based on a theoretical position stated in an article by Robertson (1961). Behavior under sensory deprivation may be viewed as a two-step process. This two-step process may be conceptualized in terms of two interlocking concepts, preoccupation and suggestibility. For example, preoccupation would seem to be an inevitable consequence of sensory deprivation. Consequently, with the elimination of all or at least the greater part of external stimulation (whether this be an overall decrease or a reduction in pattern of sensory input), it

is reasonable to expect a considerable narrowing of the individual's perceptual and ideational reactions. In brief, the individual would focus more and more on less and less. From the preoccupation, a state of suggestibility would develop. First, preoccupation implies that something looms large in the individual's awareness. It looms large in awareness and preempts his attention because in the state of sensory deprivation there is little or nothing else to which he can attend. Consequently, there is an excessive preoccupation with whatever stimulus remains. Second, the residual stimulation that dominates awareness is detached from any background or context that would provide structure and limit meaning. In the absence of such structure, the threshold for projection of thoughts and feelings, not ordinarily in conscious awareness, would be lowered. The individual would then react more freely and uncritically to the residual sensory input.

The author believes that originality or creativity can be viewed in terms of a voluntary modified sensory deprivation. What is created is often the outcome of a period of intense preoccupation with some idea, feeling, or external stimulus. The intense preoccupation is possible only because the individual has been able to eliminate distracting internal (ideational) and/or external stimuli. This preoccupied state then paves the way for the suggestibility that may be the crucial factor in being original or creative. As stated above, suggestibility occurs because some stimulation looms large in the individual's awareness and is reacted to in relative isolation from a particular context or structure. Thus, one's thinking, feeling, and preceiving are freed

sufficiently so that a particular phenomenon can be experienced in many different ways. For example, certain ideas, images, and feelings that are related to the creative task but which have been below the threshold of consciousness, can be resuscitated and utilized in a constructive manner. Stated otherwise, creativity or originality may be thought of as a deviation from the usual or the familiar, perceiving data in a novel way, making unexpected associations, a breaking with conventional conceptualizations, all of which would seem to presuppose some degree of suggestibility.

To the author's knowledge, no research has been published on the use of sensory deprivation to facilitate original thinking. However, several investigators have taken the position that short periods of social isolation and partial sensory deprivation can have a positive constructive effect on behavior (Cooper and Adams, 1962; Gibby and Adams, 1960; Lilly, 1956; Shurley, 1960). The range of deprivation time that is optimal for producing beneficial results is still undetermined. Obviously, the deprivation period needs to be long enough to produce the major effects of cognitive loosening, suggestibility, and drive for stimulation. But, the period should be short enough to avoid significant impairment of cognitive and motivational processes. From the author's own research with college students (Robertson & Browning, 1962; Robertson & Wolter, 1962), a 2-4 hour period of deprivation is suitable. Of course, factors other than time are possible sources of variance, e.g. type of deprivation and emotional stability of the subject. In the project to be reported, the type of deprivation will be the same for all subjects, and personality differences will be randomized within the sample.

METHOD

The sample consisted of 56 volunteer male college students. Using a table of random numbers, the sample was divided into four groups of 14 subjects each. All subjects took the following three tests from the Guilford Creative Battery (Guilford, 1952).

A. Alternate Uses Test in which S listed six uses to which each of nine common objects can be put. The test is scored for infrequency of the uses proposed.

B. The Consequences Test in which S is presented with ten hypothetical events and asked to list the possible consequences of each event. A score reflecting the cleverness or remoteness of the consequence suggested is then obtained.

C. Plot Titles Test in which S's score is the number of clever as opposed to obvious or ordinary titles he suggests for two story plots.

These three tests have been shown to emerge with high loadings on a factor identified as originality (Guilford, 1952). In addition to the three tests from the Guilford Battery, each subject also took the Kent-Rosanoff Word Association Test. In a series of research studies on creative persons, MacKinnon (1962) found that "unusualness of mental associations" to be one of the best predictors of creativity (see also, Maltzman, 1960).

Thus, behavior tapped by the tests described above would seem to satisfy the definition of originality proposed by Maltzman (uncommonness, relevance, amendable to experimentation), as well as meeting two of the three criteria of creativity stated by MacKinnon (novel or statistically infrequent, and adaptive or problem solving).

Experimental-deprived condition: Two of the four groups received sensory deprivation, one group for a period of two hours and the other group for a period of four hours. The instructions and procedures for the two groups are given below.

> We can't tell you too much about this project now except that we are going to give you some tests, then eliminate the usual sensory stimulation for a period of time, and then administer the same tests again. I am going to put your initials and the date on all test papers, so that later if you want to know the results, we can give them to you. Once we have finished the project, we will remove your initials and any other identifying information, and you will have only a code number. In any case, all information concerning your participation in the experiment will be kept confidential.
>
> Now the first test is a word association test. (Subject is seated across the table from the experimenter with his chair turned at an angle to avoid direct eye contact). I will say a word and then you say the first word that comes to mind. Ready--all right. Here is the first word.

After the subject had finished the Word Association test and the three tests from the Guilford battery, he was told:

> Now, these tests are different ways of measuring your ability to think in an original manner. In the next phase of the experiment, which is the isolation period, we want you to think as much as you can about these tests, so that when we administer the same tests again, you will be able to improve your performance. In other words, it is important that you try to see how you can think in an original way the next time the same tests are administered.

In the original design of the experiment, subjects were not to be given any instructions between the two administrations of the tests. However, before starting the experiment, we decided to tell all subjects to think about the tests, and how they might improve their responses when the same tests were given a second time. This was done in an effort to make conditions as comparable as possible for the experimental and control subjects (with the exception of the isolation condition), and to make

sure that the control subjects felt as motivated in the experiment as the experimental subjects. After data had been collected on six subjects, another change became necessary. All subjects were told that the tests were measures of original thinking, and that when the tests were given a second time they should try to be as original as they could in their responses. This change was made because the subjects were not taking the tests in a serious or conscientious manner. They could not see the importance or relevance of the particular test items. We felt that this departure from the original instructions would create better rapport with the subjects and elicit more cooperation.

To prepare the subject for the isolation period, cotton patches were placed over his eyes, glycerin soaked cotton was inserted in his ears, and a cotton headgear was placed over the top, sides, and back of his head. He was then taken into the isolation cubicle and placed on a bed. The isolation booth was a wooden cubicle constructed in air raid shelter area in the basement of a University building. The cubicle was 9 ft. long, 6 ft. wide, 7 ft. high, and was equipped with an air-conditioner, intercom system, window, and kymograph attached to the springs of the bed. The experimenter's station was located approximately 20 feet from the cubicle. The subject was told that he could change his body position on the bed and even sit up, but he was not to turn over on his stomach. He was told not to worry if he fell asleep for a while, but that we wanted him to spend as much time as he could thinking about how to improve his responses to the tests. The use of the intercom system was explained, and he was encouraged to use it to report his

reactions to the isolation. He was told that at the end of two (or four) hours the tests would be administered to him over the intercom. He was also told that if he needed to terminate the isolation before the time was up, he should say so over the intercom and he would be taken out. Two subjects in the four hour deprivation group terminated early and could not be given the tests a second time.

At the end of the isolation period, the experimenter spoke to the subject over the intercom, saying that the tests would now be administered. The experimenter recorded the responses on a second set of test blanks. The second administration of the tests took approximately the same length of time, one hour, as the first session. After the administration of the tests, the subject was removed from the isolation cubicle. He was seated at the experimenter's table and asked the following questions.

1. How would you describe this experience--pleasant or unpleasant?
2. What was the most difficult part of it, physically and mentally?
3. Was it easy or hard to think about the tests during the time you were in isolation? About how long do you estimate that you thought about the tests?
4. How did you find the experience of taking the tests again after this period of isolation?

After answering the questions, the subject was told that the project was being sponsored by the government, and that the general purpose was to study the effect of isolation on a person's ability to think in an original way. The experimenter explained that at the end of the project, the subject would be able to find out his test scores and how he compared with other subjects. The importance of not discussing the

experiment with anyone was stressed. The subject was told that the project would be over in approximately six months, and he could then discuss it freely with anyone.

Control-non-deprived condition. The instructions and procedure for the control subjects were the same as those for the experimental group with the exception of the following changes.

> We can't tell you too much about this project now except that we are going to give you some tests, then wait a period of time and give some tests again.
>
> Now, these tests are different ways of measuring your ability to think in an original manner. In the next phase of the experiment, we want you to remain in this building for about two (or four) hours. We want you to think as much as you can about these tests so that when we administer the same tests again, you will be able to improve your performance. In other words, it is important that you try to see how you can think in an original way the next time the same tests are administered. You can stay in Room 227 or you are free to walk around the building if you wish. While it is all right to read or talk to people, we do want you to spend as much time as you can thinking about how you can improve your responses to the tests.

At the end of two (or four) hours, the experimenter took the subject to the basement of the building and had him lie on the bed in the isolation cubicle. He was told that the tests would be administered over the intercom system. After the administration of the tests, the subject was taken out of the isolation cubicle and seated at the experimenter's desk. He was asked the same four questions that the experimental subjects were asked, with the exception that references were made to time spent in the building rather than time spent in isolation.

RESULTS

The two experimental groups were compared with the two control groups in terms of scores on the three tests from the Guilford battery and the unusualness of responses on the Kent-Rosanoff Word Association Test. A subject's originality score on the Word Association Test was his overall mean response frequency to the 100 stimulus words. The frequency assigned to each response was based on Tresselt and Leeds frequency tables for college students. The lower the mean response frequency, the higher the originality in terms of unusualness of associations. On the Plot Titles Test, the subject's originality score was the total number of "clever" titles given to the two story plots. The subject was allowed three minutes for each story plot. The normative data consists of a large number of sample responses judged high or low for cleverness for high school students. On the Alternate Uses Test, the subject's score was the total number of acceptable but infrequent or unusual uses given to nine common objects with a maximum time limit of 12 minutes. A scoring guide based on data gathered from elementary, high school, and college students, provides criteria for scoring a use as unusual or infrequent. On the Consequences Test, a subject's score was the total number of clever or remote consequences given to ten hypothetical events with a time limit of 2 minutes for each event. Again, a scoring guide based on responses from a large number of high school and young adult males provides criteria for scoring a consequence as acceptable but clever or remote.

Originally the data were to be analyzed by analysis of variance. Later it was decided that a "t" test would be a more appropriate way of analyzing group differences for this experimental design. Table I gives the "t" values for within group changes from pre- to post- test administrations for each originality measure. Table II gives the "t" values for between group comparisons on the amount of change from pre- to post- test administrations. All data were programmed for analysis on an IBM 1620 computer.

TABLE I

THE "T" VALUES FOR WITHIN GROUP COMPARISONS ON PRE AND POST SCORES FOR EACH ORIGINALITY MEASURE

	4 hour Control	4 hour Depriv.	2 hour ~~Depriv.~~ Control	2 hour Depriv.
Word Association	-.89	-.28	+1.39	+1.14
Plot Titles	-.92	-.38	-.85	-1.42
Alternate Uses	-3.07*	-3.51*	-3.10 *	-6.60 *
Consequences	-4.42*	-2.23*	-1.71 *	-1.98 *

The N for all groups is 14.
*Significant below .05 level

TABLE II

THE "T" VALUE FOR BETWEEN GROUP COMPARISONS ON AMOUNT OF CHANGE FOR EACH ORIGINALITY MEASURE

	Word Assoc.	Plot Titles	Alt. Uses	Consequences
4 hr-Depriv. vs. 2 hr-Depriv.	+ 1.11	- .47	- 1.55	+ .59
4 hr-Control vs. 2 hr-Control	+ 1.70	- .08	- .02	+ .-7
4 hr-Depriv. vs. 4 hr-Control	- .59	- .38	- .64	- .09
2 hr-Depriv. vs. 2 hr-Control	+ .17	.00	+ .46	- .56

The N for each group is 14.

Table I indicates that from pre- to post- testing all groups showed a statistically significant improvement in originality on the Alternate Uses Test and The Consequences Test. On the Word Association Test, the four hour control and the four hour deprivation groups showed a slight improvement in unusualness of associations from the pre- to post- testing. On the other hand, the two hour control and the two hour deprivation groups showed some decrease in unusualness of associations on the second administration. On the Plot Titles Test, all groups showed a slight improvement on originality on the second administration.

Table II indicates that none of the between group comparisons of the amount of change between pre- and post- test administrations were significant, or even approached the .05 level of significance.

No comparisons were made for the kymographic data on movement, intercom reports, or answers to the questions asked of each subject at the end of the experiment. The intercom reports were too few to be analyzed. The variability in kymographic data for the two deprivation groups was too large to show any significant mean difference between groups. Answers to the four questions asked at the end of the experiment were too stereotyped for any meaningful analysis.

DISCUSSION

The results do not support the hypothesis that sensory deprivation facilitates original thinking. While both deprivation groups showed significant improvement on the Alternate Uses and Consequences tests, the improvement was not significantly greater than that of the two control groups. Furthermore, the second hypothesis, that subjects having four hours of perceptual isolation would demonstrate significantly more originality than subjects having two hours of isolation, was not supported. Again, both groups showed improvement on the post-tests, but there was no significant difference in the amount of improvement.

What the study clearly indicates is that on retest, subjects given specific instructions to be as original as they can, do show significant improvement in originality scores. This finding is true only for the Alternate Uses and Consequences tests. However, the evidence for an originality factor is stronger for these tests than for the Plot Titles and Word Association tests. In evaluating the improvement shown on retest, the design of this experiment makes it impossible to distinguish the contribution of the instructional set from the contribution of familiarity with the tests. However, the work of Christensen, Guilford and Wilson (1957) points up the importance of instructions in eliciting unusual, inventive, or clever responses. Undoubtedly, both factors contribute to improvement in tests scores, though the relative weight of each cannot be determined from this research.

It should also be noted that the majority of subjects found it easier to give an oral (as in the post-tests) than a written response

(as in the pre-tests) on the three Guilford tests. Although the subjects did not improve their scores on the second administration of the Plot Titles tests, they did show a significant improvement on the Alternate Uses and Consequences tests, both of which require more writing than the Plot Titles test. In a more general sense, the differences between the first and second administration of the tests was that of self-administration versus administration by the experimenter.

Finally, the results of the study do not support the finding of cognitive impairment frequently reported in sensory deprivation research. After as much as four hours of preceptual isolation, actually five hours by the time the tests were administered, subjects showed significant improvement on two of the tests and slight improvement on the other two tests.

The statements made in this section are applicable only to the specific conditions and procedures of the study, such as the length of the isolation period, the method of restricting sensory input, the particular tests selected to measure originality, a sample limited to male college students.

SUMMARY

Fifty-six volunteer male college students, randomly divided into four groups of 14 subjects each, were given three tests from the Guilford Creative Battery and the Kent-Rosanoff Word Association test. Two groups were exposed to sensory deprivation four hours and two hours respectively. The remaining two groups were exposed to a normal sensory environment for two hours and four hours respectively. The same tests were administered again. The basic hypothesis was that subjects receiving sensory deprivation would show more improvement in originality than those exposed to normal sensory environment, and those subjects receiving four hours of isolation would show more improvement in originality than those receiving two hours of isolation. The hypothesis was not confirmed.

The results were discussed in terms of instructional set, type of test administration, and the effect of perceptual isolation on cognitive efficiency.

REFERENCES

Cooper, D. & Adams, H. Ego strength changes following perceptual deprivation. Archiv. Gen. Psychiat., 1962, 7, 213-217.

Christensen, P., Guilford, J., & Wilson, R. Relation of creative responses to working time and instructions. J. exper. Psychol., 1957, 53, 82-88.

Gibby, R. & Adams, H. Therapeutic changes in psychiatric patients following partial sensory deprivation. Archiv. Gen. Psychiat., 1960, 3, 33-42.

Guilford, J. Creativity. Amer. Psychol., 1950, 5, 444-454.

Guilford, J., Wilson, R., & Christensen, P. A factor-analytic study of creative thinking. II. Administration of tests and analysis of results. Univ. So. Calif., Rep. Psychol. Lab., no. 8, 1952.

Lilly, J. Mental effects of reduction of ordinary levels of physical stimulation on intact, healthy persons. Psychiat. Res. Rep., Amer. Psychiat. Assn., 1956, 5, 1-28.

MacKinnon, D. The nature and nurture of creative talent. Amer. Psychol. 1962, 17, 484-495.

Maltzman, I. On the training of originality. Psychol. Rev., 1960, 67, 229-243.

Meadow, A. and Parnes S. Evaluation of training in creative problem solving. J. Appl. Psychol., 1959, 43, 189-194.

Robertson, M. Theoretical implications of sensory deprivation. Psych. Record, 1961, 11, 33-42.

Robertson, M. & Browning R. The effect of sensory deprivation upon responses to a word association test. Unpublished study. Western Michigan University, 1962.

Robertson, M. & Wolter, D. The effect of sensory deprivation upon scores on the Wechsler Adult Intelligence Scale. Unpublished study. Western Michigan University, 1962.

Shurley, J. Profound experimental sensory isolation. Amer. J. Psychiat., 1960, 117, 539-545.

Stein, M. Creativity and culture, J. Psych., 1953, 36, 311-322.

Tresselt, M. E., and Leeds, J. S. The responses and frequencies of responses for 124 males and females (age 18-21) for the Kent-Rosanoff stimulus words. Psychol. Newsletter, 1953, 5 (1), (2), 1-36, 39-74.

APPENDICES

THE MEAN AND RANGE FOR EACH GROUP ON PRE AND POST TEST ADMINISTRATIONS

	4 hr. Dep.		4 hr. Control		2 hr. Dep.		2 hr. Control	
	pre	post	pre	post	pre	post	pre	post
Word Assoc.								
Mean	18.76	22.69	16.41	17.13	17.30	16.45	23.96	21.47
Range	8-21	8-20	14-21	13-20	7-21	9-22	9-22	6-24
Plot Titles								
Mean	2.93	3.13	1.93	2.43	3.14	3.71	2.21	2.78
Range	0-9	0-9	0-8	0-11	0-7	0-9	0-6	0-9
Alt. Uses								
Mean	26.33	31.57	23.78	33.50	19.00	27.64	23.14	29.85
Range	12-35	20-41	0-39	2-50	10-28	11-42	12-36	15-48
Consequences								
Mean	21.71	22.81	21.21	25.28	27.28	29.91	22.57	35.50
Range	6-34	8-34	11-34	17-40	8-29	8-31	4-45	7-48

KENT-ROSANOFF WORD ASSOCIATION TEST

1. Table	26. Wish	51. Stem	76. Bitter
2. Dark	27. River	52. Lamp	77. Hammer
3. Music	28. White	53. Dream	78. Thirsty
4. Sickness	29. Beautiful	54. Yellow	79. City
5. Man	30. Window	55. Bread	80. Square
6. Deep	31. Rough	56. Justice	81. Butter
7. Soft	32. Citizen	57. Boy	82. Doctor
8. Eating	33. Foot	58. Light	83. Loud
9. Mountain	34. Spider	59. Health	84. Thief
10. House	35. Needle	60. Bible	85. Lion
11. Black	36. Red	61. Memory	86. Joy
12. Mutton	37. Sleep	62. Sheep	87. Bed
13. Comfort	38. Anger	63. Bath	88. Heavy
14. Hand	39. Carpet	64. Cottage	89. Tobacco
15. Short	40. Girl	65. Swift	90. Baby
16. Fruit	41. High	66. Blue	91. Moon
17. Butterfly	42. Working	67. Hungry	92. Scissors
18. Smooth	43. Sour	68. Priest	93. Quiet
19. Command	44. Earth	69. Ocean	94. Green
20. Chair	45. Trouble	70. Head	95. Salt
21. Sweet	46. Soldier	71. Stove	96. Street
22. Whistle	47. Cabbage	72. Long	97. King
23. Woman	48. Hard	73. Religion	98. Cheese
24. Cold	49. Eagle	74. Whiskey	99. Blossom
25. Slow	50. Stomach	75. Child	100. Afraid

PLOT TITLES TEST

WRITE AS MANY APPROPRIATE TITLES AS YOU CAN FOR THE FOLLOWING TWO PLOTS.

Rex was six feet seven inches tall, weighed two-hundred and seventy pounds, and was a native of Finland. He was a midget auto racing driver and had entered the "Grand Prix Race," the most important midget auto race in the world. At the last lap of the race, Rex was several lengths ahead of the next car, but his motor "conked out" and his car rolled to a stop a few feet from the finish line. The next car seemed a sure winner, but Rex picked up his car and strode across the finish line, winning the Grand Prize.

A man had a wife who was not able to speak. He found a doctor who was able to restore the power of speech. Then the man's peace of mind was shattered by his wife's constant talking. He had the doctor perform an operation on him, so that although she talks endlessly, he can't hear a thing she says.

ALTERNATE USES TEST

LIST AS MANY AS SIX POSSIBLE USES FOR EACH OF THE FOLLOWING OBJECTS

1. Shoe	4. Chair	7. Wooden Pencil
2. Button	5. Watch	8. Automobile Tire
3. Key	6. Safety Pin	9. Eyeglass

CONSEQUENCES TEST

LIST AS MANY DIFFERENT CONSEQUENCES AS YOU CAN

1. What would be the results if none of us needed food any more in order to live?

2. What would be the results if humans lost their group feeling to the extent that they all preferred to live alone?

3. What would be the results if the entire United States west of the Mississippi became an arid desert?

4. What would be the results if everyone suddenly lost the sense of balance and were unable to stay in the upright position for more than a moment?

5. What would be the results if all the people in the world lost the ability to reproduce offspring?

6. What would be the results if it appeared certain that within three months the entire surface of the earth would be covered with water, except for a few of the highest mountain peaks?

7. What would be the results if everyone suddenly lost the ability to read and write?

8. What would be the results if human life continued on earth without death?

9. What would be the results if the force of gravity were suddenly cut in half?

10. What would be the results if suddenly no one could use arms or hands?